

# Module 14 Lesson Plan

## Strategies for Adverse Conditions



### Content

#### Essential Knowledge and Skills 25—26

- Understanding Reduced Visibility Driving Conditions
- Vehicle Lights for Visibility
- Sources of Glare
- Protection From Glare
- Improve Visibility from the Vehicle
- Driving at Night
- Driving in Fog
- Driving in Smoke and Dust
- Driving in Lightning
- Driving in Rain
- Low-Water Crossings
- Winter Driving
- Hot Weather Driving
- Assignment
- Assessment



## M14—Strategies for Adverse Conditions



**Lesson Objective:** The student recognizes and understands the risk involved and the reduced risk driving behaviors during reduced visibility driving conditions and extreme weather driving conditions. The student understands driver and vehicle limitations and how to apply time and space management strategies with vision control, motion control and steering control.

Instructional Topic	Content	Slide
<b>INTRODUCTION</b>	<p><b>Introduce, model, practice and discuss</b></p> <p>Prior to this lesson, information presented and discussed has been focused on how to develop an effective search for information under normal driving circumstances</p> <ul style="list-style-type: none"> <li>• This lesson addresses problems arising from limitations placed on vision, motion, and steering control when driving during adverse conditions</li> <li>• Driving conditions are not always perfect—consequently, drivers must be prepared for all types of adverse circumstances</li> <li>• Examples of adverse driving conditions include: glare, low light, darkness, fog, smoke, dust, rain, winter weather, and reduced traction</li> <li>• Ideally, drivers should stay off the road when driving conditions are hazardous</li> <li>• If driving is absolutely necessary, good habits can help drivers get to their destination safely</li> <li>• Before heading out, get road condition reports on the Web</li> <li>• Forecasts for Montana and other states are available  <a href="http://wintermt.com/roadsandweather/">http://wintermt.com/roadsandweather/</a>  <a href="http://www.mdt.mt.gov/travinfo">www.mdt.mt.gov/travinfo</a></li> </ul>	<p>T14-1</p> <p>T14-2</p>
<b>UNDERSTANDING REDUCED VISIBILITY DRIVING CONDITIONS</b>	<p><b>Introduce, model, practice and discuss</b></p> <p>About 90 percent of the driving choices are based on what the driver sees</p> <ul style="list-style-type: none"> <li>• If a hazard isn't seen, drivers can quickly drive into dangerous conditions</li> <li>• Driving during low visibility is more risky</li> <li>• Visibility to the front is limited</li> <li>• Very little can be seen to the sides</li> <li>• Drivers lose the advantage of color and contrast at night compared to what can be seen during the day</li> <li>• Judgment becomes impaired</li> </ul>	T14-3
◆ <b>Over-Driving Headlights</b>	<p>Most low-beam headlights shine on average about 350 feet ahead</p> <ul style="list-style-type: none"> <li>• Most high-beam headlights (if properly maintained) shine no more than 450 feet ahead</li> <li>• Over-driving headlights occurs when a driver is traveling at a speed that prevents stopping safely within the distance covered by the headlights</li> <li>• Information about over-driving headlights is available on the Web; example:  <a href="http://www.safetycenter.navy.mil/media/seashore/issues/spring04/overdrivinghead.htm">http://www.safetycenter.navy.mil/media/seashore/issues/spring04/overdrivinghead.htm</a></li> </ul>	T14-4

## Student Learning Activities

## Resources



M14

Instructional Topic	Content	Slide
<b>VEHICLE LIGHTS FOR VISIBILITY</b>	<p><b>Introduce, model, practice and discuss</b></p> <p>Montana Laws</p> <p>Montana requires headlights to be used any time from a half hour after sunset until a half hour before sunrise or whenever objects can't be seen at 500 feet or less</p> <ul style="list-style-type: none"> <li>• High beams must illuminate vehicles and people at 350 feet Use high beams as much as possible on highways and unlighted street ... Maximum safe speed with high beams is 60 mph</li> <li>• Low beams must illuminate vehicles and people at 100 feet ahead ... Low-beam headlights are made for speeds up to 40 mph</li> <li>• Turn on headlights at dusk or on overcast days</li> <li>• All vehicles must have two taillights ... Taillights must be RED ... Taillights must be visible for 500 feet</li> <li>• Brake lights must be RED or AMBER ... Brake lights must be visible for 100 feet in sunlight ... Vehicles must have at least one brake light ... It is against the law to travel with no brake light</li> <li>• Montana law requires drivers to dim lights when oncoming vehicles are within 1,000 feet and 500 feet of overtaking a vehicle</li> </ul>	T14-5
◆ <b>Common Courteous Practices</b>	<p>The common courteous practice of most drivers is to dim their headlights when approaching within 1,500 feet of an oncoming vehicle</p> <ul style="list-style-type: none"> <li>• Inside that range, it is uncomfortable for oncoming drivers and they will "remind" drivers to dim their lights ... Use high beam as much as possible, but be courteous to others</li> </ul>	
◆ <b>Headlamp Height Limit</b>	<p>Federal safety standards require headlights not exceed 54 inches in height</p> <ul style="list-style-type: none"> <li>• Many larger vehicles such as SUVs and light trucks ride higher than cars; as a result, their headlights ride higher, too – almost nine inches higher</li> <li>• Drivers are challenged when blinded by lights shining directly into their eyes by the vehicle behind</li> </ul>	T14-6
◆ <b>Aligning Headlights</b>	<p>Headlights need to be aligned correctly to see the road better and help other drivers avoid glare</p> <ul style="list-style-type: none"> <li>• If pointed as little as one degree too high, lights can affect oncoming drivers ... Misaimed beams also don't show needed light on the road Vehicles more than five years old are twice as likely to have misaligned headlights than newer vehicles</li> <li>• When checking headlight alignment, use a flat surface with a light-colored wall in front of the vehicle ... If necessary, have a mechanic check the alignment ... One source for instruction for aligning headlights: <i>Blinded by the Light</i> brochure by the AAA Foundation, online at <a href="http://www.aaafoundation.org">www.aaafoundation.org</a></li> </ul>	T14-7

## Student Learning Activities

## Resources



**VEHICLE LIGHTS FOR VISIBILITY**  
Montana Laws

All vehicles must have two <b>red taillights</b> that can be seen for 500 feet	<b>Headlights</b> on a half hour after sunset until a half hour before sunrise or whenever visibility can't be seen at 500 feet or less	<b>Lights must be dimmed</b> when oncoming vehicles are within 1,000 feet and 500 feet of overtaking a vehicle
<b>Low beams</b> must show vehicles and people at 100 feet ahead	<b>Brake lights</b> must be <b>RED</b> or <b>AMBER</b> and be visible 100 feet in sunlight	<b>High beams</b> must show vehicles and people at 350 feet ahead

OPI

**HEADLIGHT HEIGHT**

- Federal safety standards require headlights not exceed 54 inches in height
- Many larger vehicles such as SUVs and light trucks have headlights almost nine inches higher than cars
- Drivers are blinded by lights shining directly into their eyes from the vehicle behind

OPI

**ALIGNING HEADLIGHTS**

- Headlights need to be aligned correctly to see the road better and help other drivers avoid glare
- If pointed as little as one degree too high, lights can affect oncoming drivers
- Miss-aimed beams also don't show needed light on the road

Aligning headlights information provided by the Light Foundation, online at [www.aaafoundation.org](http://www.aaafoundation.org)

OPI

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Instructional Topic	Content	Slide
<p>◆ <b>Headlight Maintenance</b></p>	<p>Occasionally drivers may be seen driving with only one working headlight</p> <ul style="list-style-type: none"> <li>• This can create risk to the vehicle's occupants and other road users</li> <li>• A simple check of all lights can improve safety for everyone               <ul style="list-style-type: none"> <li>... Replace broken headlights immediately</li> <li>... Keep them clean</li> </ul> </li> </ul>	T14-8
<p>◆ <b>High-Tech Lights</b></p>	<p>A new type of headlight is becoming more common—High Intensity Discharge (HID) lights</p> <ul style="list-style-type: none"> <li>• HID lights emit twice the light of regular halogen headlights               <ul style="list-style-type: none"> <li>... They produce a blue-white light—other headlights look yellow</li> <li>... They are more expensive than halogen lights</li> </ul> </li> <li>• Studies indicate the HID lights flood the roadway with a wider, brighter, more uniform light than regular halogens</li> <li>• Drivers facing these lights have complained and the federal government is evaluating the amount of glare they produce and if safer design requirements are needed</li> <li>• Information about HID lights is available on the Web; one source: <a href="http://www.consumerreports.org/cro/cars/maintenance-accessories/hid-headlights-403/overview.htm">http://www.consumerreports.org/cro/cars/maintenance-accessories/hid-headlights-403/overview.htm</a></li> </ul>	T14-9
<p><b>SOURCES OF GLARE</b></p>	<p><b>Introduce, model, practice and discuss</b></p> <p>Glare is a condition of discomfort in the eyes and a reduction in the ability to see when a bright light enters the field of vision, especially when the eyes have adapted to dark driving conditions</p> <ul style="list-style-type: none"> <li>• Glare can be severe enough to cause drivers to be unable to see small changes in brightness and reduces the distance where drivers can identify objects</li> <li>• Eyes must adjust to the glare and for some drivers glare recovery can take a long time; a lot of distance can be covered quickly depending upon speed</li> </ul> <p>Many sources contribute to glare when driving:</p> <ul style="list-style-type: none"> <li>• Bright sun</li> <li>• Unshielded street lights</li> <li>• Bright advertising signs</li> <li>• Weather conditions</li> <li>• Improperly adjusted headlights</li> <li>• Illegal high-wattage bulbs in non-compliant after-market products</li> </ul> <p>As seasons change, the angle of the sun rising and setting can cause more glare, whether driving into or away from the sun</p>	<p>T14-10</p> <p>T14-11</p>

# Student Learning Activities

# Resources



## HEADLIGHT MAINTENANCE

- Occasionally drivers may be seen driving with only one headlight working
- This can create risk to the vehicle's occupants and other road users
- A simple check of all lights can improve safety for everyone



Replace broken headlights immediately  
Keep them clean

OPI

M14 - 8  
Sept 2006

## HIGH-TECH HEADLIGHTS

- A new type of headlight is becoming more common—High Intensity Discharge (HID) lights
- HID lights emit twice the light of regular halogen headlamps
- They produce a blue-white light—other headlights look yellow
- They are more expensive than halogen lights



<http://www.consumerreports.org>

OPI

M14 - 9  
Sept 2006

## SOURCES OF GLARE

- Glare reduces the distance where drivers can identify pedestrians or vehicles and can be severe enough to cause drivers to be unable to see small changes in brightness



Eyes must adjust to the glare and for some drivers glare recovery can take a long time; a lot of distance can be covered quickly depending upon speed

OPI

M14 - 10  
Sept 2006

## SOURCES OF GLARE

- Bright sun
- Unshielded street lights
- Bright advertising signs
- Weather conditions
- Improperly adjusted headlights
- Illegal high-wattage bulbs in non-compliant aftermarket products
- As seasons change, the angle of the rising and setting sun causes more glare, whether driving into or away from the sun



OPI

M14 - 11  
Sept 2006

M14

Instructional Topic	Content	Slide
<div data-bbox="201 363 370 428"><b>PROTECTION FROM GLARE</b></div> <div data-bbox="201 485 386 548">◆ Vehicle Illumination</div> <div data-bbox="201 653 370 684">◆ Avert Eyes</div> <div data-bbox="201 852 407 915">◆ Mirror Day/ Night Settings</div> <div data-bbox="201 1089 407 1184">◆ Rearview Enhanced Mirror Setting</div> <div data-bbox="201 1220 407 1283">◆ Self-Dimming Mirrors</div> <div data-bbox="201 1362 367 1467">◆ Anti-Reflective Eyeglass</div>	<p><b>Introduce, model, practice and discuss</b></p> <p>Adjust the vehicle's interior lighting for protection from glare</p> <ul style="list-style-type: none"> <li>• If street lights cause a lot of glare, dim the dashboard lights and use the sun visor</li> <li>• Avoid using any other light inside the vehicle</li> </ul> <p>If oncoming headlights are too bright, look to the right and use the painted "fog line" or edge of the road as a reference to keep the vehicle aligned to the desired path of travel</p> <ul style="list-style-type: none"> <li>• Keep an eye on the approaching vehicle out of the left corner of the field of vision</li> </ul> <p>All cars have "day/night" interior rearview mirrors to reduce reflected glare from vehicles directly behind</p> <ul style="list-style-type: none"> <li>• Develop the habit of easily changing the mirror to the "night" setting by flipping the small lever at the bottom of the mirror</li> <li>... This changes the angle of the reflective surface and the lights will appear dimmer and less distracting</li> </ul> <p>The enhanced mirror setting also reduces glare from vehicles behind (Discussed in Module 2)</p> <p>Many newer vehicles offer self-dimming mirrors</p> <ul style="list-style-type: none"> <li>• These mirrors are also available as an after-market option</li> <li>... As the glare becomes brighter, the mirrors become darker</li> </ul> <p>Drivers who must wear eye glasses can have their glasses coated with an anti-reflective coating</p> <ul style="list-style-type: none"> <li>• The coating actually transmits more light (about eight percent more) and improves vision both day and night</li> </ul>	<p>T14-12</p> <p>T14-13</p> <p>T14-14</p> <p>T14-15</p> <p>T14-16</p> <p>T14-17</p>
<div data-bbox="201 1524 407 1619"><b>IMPROVE VISIBILITY FROM THE VEHICLE</b></div> <div data-bbox="201 1661 375 1724">◆ Clean Headlights</div>	<p><b>Introduce, model, practice and discuss</b></p> <p>Drivers can take steps to help improve driving visibility during extreme weather</p> <ul style="list-style-type: none"> <li>• Keep the headlights clean</li> <li>... Road grime can reduce light effectiveness by 90 percent and dangerously reduce the ability to see at night</li> </ul>	<p>T14-18</p>

## Student Learning Activities

## Resources



### PROTECTION FROM GLARE

#### Inside the Vehicle

- Adjust the vehicle's interior lighting for protection from glare
- If street lights cause a lot of glare, dim the dashboard lights and use the sun visor
- Avoid using any other light inside the vehicle


 914 - 12  
April 1999

### AVERT EYES

- To protect from bright headlights, look to the right and use the painted "fog line" or edge of the road as a reference
- Keep an eye on the approaching vehicle out of the left corner of the field of vision


 914 - 13  
April 1999

### MIRROR DAY/NIGHT SETTINGS



- Develop the habit of easily changing the mirror to the "night" setting by flipping the small lever at the bottom of the mirror
- This changes the angle of the reflective surface and the lights will appear dimmer and less distracting


 914 - 14  
April 1999

### BGE MIRROR SETTINGS



The Blind Zone Glare Elimination (BGE) enhanced side mirror settings (15 degrees to the outside) eliminates right and left side mirror blind areas


 914 - 15  
April 1999

### SELF-DIMMING LIGHTS

- Many newer vehicles offer self-dimming mirrors
- These mirrors are also available as an after-market option
- As the glare becomes brighter, the mirrors become darker


 914 - 16  
April 1999

### IMPROVE VISIBILITY FROM THE VEHICLE

- Drivers can take steps to help improve driving visibility during extreme weather
- Keep the headlights clean
- Road grime can reduce light effectiveness by 90 percent and dangerously reduce the ability to see at night



Clean Headlights, Windows

 914 - 17  
April 1999

**M14**

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## Student Learning Activities

## Resources



### PROTECT THE EYES

- Glare and low-light driving can create eye fatigue
- Keep good ventilation inside the vehicle
- Take frequent breaks to rest the eyes
- Scratched eyeglasses or contact lenses also make glare worse
- Wear quality sunglasses during the day with polarized lenses and UV protection to help reduce glare
- Lower the sun visor by pushing it all the way forward, then pulling it back to the proper position
- Wear a hat with a brim




OPI

914 - 19  
Sept 1999

### DRIVING AT NIGHT

- Darkness impairs vision causing an increase in reaction time
- Darkness also makes it more difficult to judge other vehicles' speed



OPI

914 - 20  
Sept 1999

### REDUCED-RISK DRIVING HABITS

- Ask passengers to help search into hills and curves, and for deer
- Keep the eyes moving while looking for potential hazards
- This helps avoid highway hypnosis
- Use high beams whenever possible
- Never use high beams because the oncoming driver has neglected to change to low beams—it increases the chance of a head-on collision
- Increase following distance to four- to five-seconds at a minimum
- Reduce speed, drive within the headlight's projection
- Be able to stop within the range of the headlight projection
- Some states require reduced speeds at night
- Be aware that drunk driving increases at night—drive alert and be aware



OPI

914 - 21  
Sept 1999

### DRIVING IN FOG

- Driving in fog is like driving in a cloud at ground level
- Fog and mist are both made of tiny water droplets suspended in air—the difference between them is the density
- Fog is denser and contains more water droplets than mist



OPI

914 - 22  
Sept 1999

### DRIVING IN FOG

- Fog can be patchy, going from a light mist to a thick blanket in an instant
- Fog can reduce visibility to one-fourth mile or less, creating hazardous driving conditions



Statistically fog is the most dangerous driving hazard in existence

OPI

914 - 23  
Sept 1999

M14

Instructional Topic	Content	Slide
<b>DRIVING IN FOG (Cont.)</b>	<p>On the Georgia-Tennessee border, fog caused what looked like a deadly game of dominoes</p> <ul style="list-style-type: none"> <li>A 125 car pile-up killed four people and injured 40 more</li> </ul>	
◆ <b>Case Histories</b>	<p>In Salt Lake City, a chain reaction crash in fog claimed one life and sent 30 people to the hospital.</p> <p>In California, two women were on their way to an airport when suddenly fog appeared out of a clear blue sky. Their car crashed into another vehicle, it was then broadsided by an SUV and then hit again by a truck. Hurt, but alive, the women scrambled out of the shattered back window. It turned out to be the largest accident in California history. Nearly 200 vehicles collided that day, 100 people were injured—though, miraculously, everyone survived.</p> <p>Fog can reduce visibility to one-fourth mile or less, creating hazardous driving conditions</p> <ul style="list-style-type: none"> <li>Statistically it's the most dangerous driving hazard in existence</li> </ul>	
◆ <b>Reduced Risk Driving Habits</b>	<p>If a trip can't be postponed until dense fog lifts—usually by late morning or the Afternoon—use these reduced risk driving habits:</p> <ul style="list-style-type: none"> <li>The safest solution if fog is encountered is to move well off the road and wait for the fog to lift</li> <li>Drive with lights on low beam—high beams will only be reflected back off the fog and actually impair visibility more               <ul style="list-style-type: none"> <li>... Don't rely on parking lights—they provide little visibility</li> </ul> </li> <li>Avoid using emergency flashers—studies have shown drivers are attracted to flashing lights and tend to drive into them</li> <li>Reduce speed—and watch the speedometer—fog creates a visual illusion of slow motion—the driver may actually be speeding               <ul style="list-style-type: none"> <li>... Studies show that some drivers acclimate themselves to foggy conditions and unconsciously increase their speed over time</li> </ul> </li> <li>Listen for traffic that can't be seen—open the window a little to hear better</li> <li>Use windshield wipers and defrosters as necessary for maximum visibility</li> <li>Use the right edge of the road or painted fog line as a guide</li> <li>Be patient—do not pass lines of traffic</li> <li>Do not stop on a freeway or heavily traveled road               <ul style="list-style-type: none"> <li>... If the car stalls or becomes disabled, turn the vehicle's lights off and take the foot off of the brake pedal</li> <li>... If unable to continue, pull well onto the shoulder, getting the vehicle completely off the road.</li> <li>... People tend to follow taillights when driving in fog—move away from the vehicle to avoid injury</li> </ul> </li> </ul>	<p>T14-24</p> <p>T14-25</p> <p>T14-26</p>

## Student Learning Activities

## Resources



**REDUCED RISK DRIVING HABITS IN FOG**

- On foggy days, the safest solution is to move well off the road and wait for the fog to lift
- Drive with lights on low beam—high beams reflect off the fog
- Don't rely on parking lights—they provide little visibility
- Use windshield wipers and defrosters as necessary
- Use the right edge of the road or painted fog line as a guide
- Slow down and be patient—do not pass lines of traffic



OPI

**REDUCED RISK DRIVING HABITS IN FOG**

- Reduce speed - studies show that some drivers acclimate themselves to foggy conditions and unconsciously increase their speed over time
- Listen for traffic that can't be seen



OPI

**REDUCED RISK DRIVING HABITS IN FOG**

- Do not stop on a freeway or heavily traveled road
- If the car stalls or becomes disabled, turn the vehicle's lights off and take the foot off of the brake pedal
- If unable to continue, pull well onto the shoulder, getting the vehicle completely off the road
- People tend to follow tail lights when driving in fog—move away from the parked vehicle to avoid injury



OPI

M14

Instructional Topic	Content	Slide
<p>◆ <b>Reduced Risk Driving Habits</b></p>	<ul style="list-style-type: none"> <li>• If the vehicle is equipped with fog lights, use them</li> <li>• Avoid stopping in the middle of the road—it's a guarantee of a rear-end collision</li> <li>• Remember that other drivers also have limited vision control, signal early and tap lightly on the brake pedal when slowing</li> <li>• Be aware fog can leave the roadways slick, traction will be reduced</li> <li>• There are many sources on the Web that provide driving tips during extreme weather conditions, shown below is one such source: ... The Weather Channel <a href="http://www.weather.com/activities/driving/drivingsafetytips">http://www.weather.com/activities/driving/drivingsafetytips</a> ... The Weather Channel also has an interactive game where drivers can test their driving skills during six weather challenges</li> </ul>	T14-27
<p><b>DRIVING IN SMOKE AND DUST</b></p>	<p><b>Introduce, model, practice and discuss</b></p> <p>Smoke can be caused by forest fires, buildings on fire, preparing farmland or by accidental brush fires</p> <ul style="list-style-type: none"> <li>• Dust can be caused by wind in dry desert areas or in agricultural areas</li> <li>• Do not drive through areas with severely reduced visibility—conditions can change quickly and increase in intensity</li> </ul>	T14-28
<p>◆ <b>Reduced Risk Driving Habits</b></p>	<p><u>If driving into smoke or dust:</u></p> <ul style="list-style-type: none"> <li>• Identify clouds of dust or smoke early</li> <li>• Turn on low beams and reduce speed</li> <li>• Turn on the windshield wipers if needed</li> <li>• Close windows</li> <li>• Slow down to be able to stop in half the visible distance</li> <li>• If visibility is severely reduced, move off the road as far as possible and turn off the lights—wait for conditions to improve before continuing on</li> </ul>	T14-29
<p><b>DRIVING IN LIGHTNING</b></p>	<p><b>Introduce, model, practice and discuss</b></p> <p>People are in danger from lightning if thunder can be heard</p> <ul style="list-style-type: none"> <li>• Because light travels much faster than sound, lightning flashes can be seen long before the resulting thunder is heard</li> <li>• Knowing how far away a storm is does not mean there is danger only when the storm is overhead</li> <li>• Estimate the number of miles from a thunderstorm by counting the number of seconds between a flash of lightning and the next clap of thunder ... Divide this number by five to determine how far away the storm is</li> </ul>	T14-30 T14-31 T14-32
<p>◆ <b>Reduced Risk Driving Habits</b></p>	<p><u>Safety procedures if in a car during thunderstorms:</u></p> <ul style="list-style-type: none"> <li>• Pull safely onto the shoulder of the road away from any trees that could fall on the vehicle</li> <li>• Turn on your emergency flashers</li> <li>• Avoid blocking underpasses</li> </ul>	T14-33

## Student Learning Activities


## Resources



**DRIVING IN LIGHTNING**

- Estimate the number of miles from a thunderstorm by counting the number of seconds between a flash of lightning and the next clap of thunder
- Divide this number by five to determine how far away the storm is

**How far away is the storm?**



OPI

**REDUCED RISK DRIVING HABITS IN LIGHTNING**

- Pull safely onto the shoulder of the road away from any trees and electrical wires that could fall on the vehicle
- Turn on your emergency flashers
- Avoid blocking underpasses
- To avoid being shocked, do not touch metal objects or conducting surfaces inside or outside the car



OPI

**REDUCED RISK DRIVING HABITS IN FOG**

- If the vehicle is equipped with fog lights, use them
- Avoid stopping in the middle of the road—it's a guarantee of a rear-end collision
- Remember that other drivers also have limited vision control, signal early and tap brakes lightly when slowing to stop
- Be aware fog can leave the roadways slick, traction will be reduced



OPI

**DRIVING IN SMOKE AND DUST**

- Smoke can be caused by forest fires, buildings on fire, preparing farmland or by accidental brush fires
- Dust can be caused by wind in dry desert areas or in agricultural areas
- Do not drive through areas with severely reduced visibility—conditions can change quickly and increase in intensity






OPI

**REDUCED RISK DRIVING HABITS IN DUST AND SMOKE**

- Identify clouds of dust or smoke early
- Turn on the windshield wipers if needed
- Close windows
- If visibility is severely reduced, move off the road as far as possible and wait for conditions to improve before continuing on



OPI

**DRIVING IN LIGHTNING**


- People are in danger from lightning if thunder can be heard
- Because light travels much faster than sound, lightning flashes can be seen long before the resulting thunder is heard



OPI

**DRIVING IN LIGHTNING**

- Knowing how far away a storm is does not mean there is danger only when the storm is overhead



OPI

M14

Instructional Topic	Content	Slide
<p>◆ <b>Reduced Risk Driving Habits (Cont.)</b></p>	<ul style="list-style-type: none"> <li>To avoid being shocked, do not touch metal objects or conducting surfaces inside or outside the car</li> <li>Lightning can travel through wet ground to the car               <ul style="list-style-type: none"> <li>... While the steel frame of a hard-topped vehicle increases protection if passengers are not touching metal, rubber tires do not provide protection from lightning</li> <li>... Although passengers may be injured if lightning strikes the car, passengers are much safer inside a vehicle than outside</li> </ul> </li> </ul>	T14-34
<p><b>DRIVING IN RAIN</b></p>	<p><b>Introduce, model, practice and discuss</b> Wet roads can be as dangerous as icy roads</p>	T14-35
	<ul style="list-style-type: none"> <li>Roads are more dangerous at the start of a light rain when road oil and water mix to form a greasy film on the road</li> <li>Always reduce speed in wet weather—more distance is needed for stopping and turning—may result in a skid</li> </ul>	T14-36
<p>◆ <b>Hydroplaning</b></p>	<p>Tires may lose all contact with the wet road and start to “hydroplane” or ride on top of a film of water like a set of water skis</p> <ul style="list-style-type: none"> <li>When that happens, drivers can’t brake, accelerate, or turn               <ul style="list-style-type: none"> <li>... A gust of wind, a curve or even a lane change can cause a skid</li> </ul> </li> </ul>	T14-38
<p>◆ <b>Reduced Risk Driving Habits</b></p>	<p>To reduce the chance of hydroplaning</p> <ul style="list-style-type: none"> <li>Slow down during rainstorms or when roads are slushy</li> <li>Slow down if the road has standing water or puddles</li> <li>Replace tires as soon as they become worn</li> <li>Keep tires properly inflated</li> </ul>	T14-38
	<p>If driving over a slippery area where a car has started to hydroplane</p> <ul style="list-style-type: none"> <li>Maintain a steady speed and keep the eyes on the target and steer to the target</li> <li>Slowly take the foot off the gas pedal</li> <li>Don’t try to stop or turn quickly until the tires are gripping the road again</li> <li>If the vehicle is not equipped with ABS brakes, pump brakes gently</li> </ul>	T14-39

## Student Learning Activities

## Resources



## REDUCED RISK DRIVING HABITS IN LIGHTNING

- Lightning can travel through wet ground to the car
- While the steel frame of a hard-topped vehicle increases protection if passengers are not touching metal, rubber tires do not provide protection from lightning
- Although passengers may be injured if lightning strikes the car, passengers are much safer inside a vehicle than outside



M14 - 24

## DRIVING IN RAIN

- Wet roads can be as dangerous as icy roads
- Roads are more dangerous at the start of a light rain when road oil and water mix to form a greasy film on the road



M14 - 25

## DRIVING IN RAIN

- Always reduce speed in wet weather—more distance is needed for stopping and turning may result in a skid



M14 - 26

## HYDROPLANING

- Tires may lose all contact with the wet road and start to "hydroplane" or ride on top of a film of water like a set of water skis
- When that happens, drivers can't brake, accelerate, or turn
- A gust of wind, a curve or even a lane change can cause a skid



M14 - 27

## Reduced Risk Driving Habits in Rain

To reduce the chance of hydroplaning:

- Slow down during rainstorms or when roads are slushy
- Slow down if the road has standing water or puddles
- Replace tires as soon as they become worn
- Keep tires properly inflated



M14 - 28

## Reduced Risk Driving Habits in Rain

If driving over a slippery area where a car has started to hydroplane:

- Maintain a steady speed and look and steer to the target
- Slowly take the foot off the gas pedal
- Don't try to stop or turn quickly until the tires are gripping the road again
- If the vehicle is not equipped with ABS brakes, pump brakes gently



M14 - 29

M14

Instructional Topic	Content	Slide
<div>LOW-WATER CROSSINGS</div>	<p><b>Introduce, model, practice and discuss</b> More than half of all low-water crossing vehicular-related deaths occur at night</p>	<p>T14-40 T14-41</p>
<p>◆ Myths and Facts</p>	<p><b><u>Myths and Facts</u></b>  <b>Myth:</b> The size and weight of my vehicle will keep me from floating away</p> <p><b>Fact:</b> People have extreme confidence in the size and weight of their vehicle, and think it can't be washed away—but it can be very easily</p> <ul style="list-style-type: none"> <li>• A 46,000-pound, fully-loaded cement truck was swept down the Los Angeles River in less than two feet of swift water</li> <li>• Eighty percent of fatalities in flash floods are the result of drivers ignoring obvious warning signs on open roads, including a washed out road ahead, or driving around marked flood barricades placed by public safety personnel</li> </ul> <p>All vehicles can float and be swept away in a flood</p> <p><b>Myth:</b> Driving fast through a flooded roadway will help me cross safely</p> <p><b>Fact:</b> Driving fast through water will cause a vehicle to hydroplane—once this begins, all control is lost</p> <p><b>Myth:</b> If many people have already driven through flooded areas and didn't have any problems, it's probably OK for me to drive through, too</p> <p><b>Fact:</b> This is probably the most life-taking misconception What people do not realize is that only a very small increase in water level will make a big difference</p> <p><b>Fact:</b> Just six inches of fast-moving flood water can knock a pedestrian off their feet and cause a driver to lose control</p> <p><b>Fact:</b> A depth of two feet will float a car</p> <p><b>Fact:</b> Water weighs 62.4 lbs. per cubic foot and typically flows downstream at 6 to 12 miles an hour</p> <p><b>Fact:</b> When a vehicle stalls in the water, the water's momentum is transferred to the car</p> <ul style="list-style-type: none"> <li>• For each foot the water rises, 500 lbs. of lateral force is applied to the car</li> </ul> <p><b>Fact:</b> For each foot the water rises up the side of the car, the car displaces 1,500 lbs. of water</p> <ul style="list-style-type: none"> <li>• This makes the car weighs 1,500 lbs. less for each foot the water rises</li> </ul>	<p>T14-42 T14-43 T14-44 T14-45 T14-46</p>

# Student Learning Activities

# Resources



Montana Driver Education and Training

Strategies for Adverse Conditions

Part II

OPI

1014 - 40

LOW-WATER CROSSINGS

- More than half of all low-water crossing vehicular-related deaths occur at night

OPI

1014 - 41

Myths and Facts

- Myth:** The size and weight of my vehicle will keep me from floating away
- Fact:** People have extreme confidence in the size and weight of their vehicle, and think it can't be washed away—but it can be very easily
- A 46,000-pound, fully-loaded cement truck was swept down the Los Angeles River in less than two feet of swift water
- 80% of ALL FATALITIES in flash floods are the result of drivers ignoring obvious warning signs on open roads, including a washed out road ahead, or driving around marked flood barricades placed by public safety personnel
- All vehicles can float

OPI

1014 - 42

Myths and Facts

- Myth:** Driving fast through a flooded roadway will help me cross safely
- Fact:** Driving fast through water will cause a vehicle to hydroplane—once this begins, all control is lost

OPI

1014 - 43

Myths and Facts

- Myth:** If many people have already been able to drive through flooded areas and didn't have any problems, it's probably okay for me to drive through, too
- Fact:** This is probably the most life-taking misconception. What people do not realize is that only a very small increase in water level will make a big difference

OPI

1014 - 44

Myths and Facts

- Fact:** Just 6 inches of fast-moving flood water can knock a pedestrian off their feet and cause a driver to lose control
- Fact:** A depth of 2 feet will float a car
- Fact:** Water weighs 62.4 lbs. per cubic foot and typically flows downstream at 6 to 12 miles an hour

OPI

1014 - 45

Myths and Facts

- Fact:** When a vehicle stalls in the water, the water's momentum is transferred to the car
- For each foot the water rises, 500 lbs. of lateral force are applied to the car
- Fact:** For each foot the water rises up the side of the car, the car displaces 1,500 lbs of water
- In effect, the car weighs 1,500 lbs. less for each foot the water rises

OPI

1014 - 46

M14

Instructional Topic	Content	Slide
◆ Flash Floods	<p>Flash floods: When rain is channeled quickly to the outflow point of the basin, a sudden increase in discharge can result</p> <ul style="list-style-type: none"> <li>Flash flooding is not specific to any particular time of year</li> <li>Flash floods usually occur within a few minutes or hours of excessive rainfall</li> <li>Rapidly rising water can reach heights of 30 feet or more</li> <li>Flash flooding rains can trigger catastrophic mudslides without warning</li> <li>Nearly one-third of flooded roads and bridges are structurally unsound</li> </ul>	<p>T14-47</p> <p>T14-48</p>
◆ Reduced Risk Driving Habits	<p>If a flooded area is in the planned path of travel, turn around and go another way</p> <p>If a vehicle stalls in rapidly rising water</p> <ul style="list-style-type: none"> <li>If it is safe to jump to dry ground, do so immediately</li> <li>Do NOT stay with the car, abandon it immediately for higher ground</li> <li>If the water is coming up too fast, or the vehicle has been driven too far out, DO NOT try to wade over to dry ground</li> <li>Less than six-inches of fast-flowing water can sweep people off their feet</li> <li>Climb to the roof of the vehicle and call to witnesses to immediately dial 911</li> </ul> <p>The odds of crossing safely, regardless of the type of vehicle being driven, are low</p> <ul style="list-style-type: none"> <li>Heavy military trucks driven by the National Guard have been swept downstream in what appeared to be just a foot or two of water</li> </ul> <p>Never try to outrun a flash flood down a canyon, arroyo, or cement-lined flood control channel by foot or in a vehicle</p> <ul style="list-style-type: none"> <li>If a sudden loud sound upstream is heard, exit the vehicle, leave a campsite, and seek higher ground immediately</li> <li>There may be no warning by authorities, and only seconds to evacuate to higher ground</li> </ul> <p><u>Flood Preparation</u></p> <ul style="list-style-type: none"> <li>Know the flood risk and elevation above flood stage—know if local streams or rivers flood easily</li> <li>Be prepared to move to a place of safety</li> <li>Know evacuation routes</li> <li>Keep fuel in the gas tank—if electric power is cut off, gas stations may not be able to operate pumps for several days</li> <li>Store drinking water in clean bathtubs and in various containers; water service may be interrupted</li> <li>Keep a stock of food that requires little cooking and no refrigeration; electric power may be interrupted</li> <li>Keep first aid supplies on hand</li> <li>Keep a National Oceanic and Atmospheric Administration (NOAA) Weather Radio, a battery-powered portable radio, emergency cooking equipment, and flashlights in working order</li> </ul>	<p>T14-49</p> <p>T14-50</p> <p>T14-51</p>

## Student Learning Activities

## Resources



**Road Closed**

- When rain is channeled quickly to an outflow area, a sudden increase in water occurs
- Flash flooding is not specific to any particular time of year
- Flash floods usually occur within a few minutes or hours of excessive rainfall
- Rapidly rising water can reach heights of 30 feet or more
- Flash flooding rains can trigger catastrophic mudslides without warning
- Nearly one-third of flooded roads and bridges are structurally unsound

OPI

**Road Closed**

- If it is safe to jump to dry ground, do so immediately
- Do NOT stay with the car, abandon it immediately for higher ground
- If the water is coming up too fast, or the vehicle has been driven too far out, DO NOT try to wade over to dry ground
- Less than six-inches of fast-flowing water can sweep people off their feet
- Climb to the roof of the vehicle and call to witnesses to immediately dial 911
- The odds of making it across safely regardless of the type of vehicle being driven are low

OPI

**Road Closed**

- Heavy military trucks driven by the National Guard have been swept downstream in what appeared to be just a foot or two of water

OPI

**Road Closed**

- Never try to outrun a flash flood down a canyon, arroyo, or cement-lined flood control channel by foot or in a vehicle
- If a sudden loud sound upstream is heard, exit the vehicle, leave a campsite, and seek higher ground immediately
- There may be no warning by authorities, and only seconds to evacuate to higher ground

OPI

**FLOOD PREPARATION**

- Know the flood risk and elevation above flood stage—know if local streams or rivers flood easily
- Be prepared to move to a place of safety
- Know evacuation routes
- Keep fuel in the gas tank—if electric power is cut off, gas stations may not be able to operate pumps for several days
- Store drinking water in clean bathtubs and in various containers; water service may be interrupted
- Keep a stock of food that requires little cooking and no refrigeration
- Keep first aid supplies on hand
- Keep a battery-powered portable radio, emergency cooking equipment, and flashlights in working order

OPI

**M14**

Instructional Topic	Content	Slide
<p>◆ <b>Reduced Risk Driving Habits (Cont.)</b></p>	<ul style="list-style-type: none"> <li>• Visit the National Oceanic and Atmospheric Administration (NOAA) at ... <a href="http://www.noaa.gov/floods.html">http://www.noaa.gov/floods.html</a> ... This Web site also has an interactive map displaying current river conditions around the United States and its territories</li> <li>• Under conditions of low-visibility the vulnerability of the driver and passengers to the hidden danger is greatly magnified</li> <li>• If in an area where flooding may occur, move the vehicle to higher ground if flooding is expected ... Avoid damage to the vehicle by moving it from a flooded area as soon as possible; it may also be a hazard or cause obstruction to emergency services</li> <li>• Do not drive unless absolutely necessary</li> <li>• Do not attempt to drive through water if unsure of the depth</li> <li>• Don't drive through fast-moving water, such as at a flooded bridge approach—the car could be swept away</li> <li>• Drive slowly and steadily to avoid creating a bow wave, and allow on-coming traffic to pass first</li> <li>• Keep the engine revving by slipping the clutch otherwise water in the exhaust could stall the engine</li> <li>• Modern vehicles are fitted with catalytic converters in the exhaust system—the catalyst normally works at high temperatures and may crack if it is submerged in water ... Replacement catalysts are expensive.</li> <li>• The air intake on many modern cars is located down low at the front of the engine bay and it only takes a small quantity of water sucked into the engine to cause serious damage ... All engines are affected but turbo-charged and diesel engines are most vulnerable</li> <li>• Be considerate—driving through water at speeds above a slow crawl can result in water being thrown onto pavements, soaking pedestrians or cyclists</li> <li>• If the car stalls, immediately abandon it and climb to higher ground ... Watch footing—just six inches of fast-moving floodwater can sweep a person off his or her feet</li> <li>• Test the brakes as soon as possible after driving through water</li> <li>• If the vehicle has been in the flooded area for any prolonged period contact a mechanic for further advice ... If the vehicle has only been in a flood for a short period, drive with extreme caution and take the car to be checked at the earliest opportunity</li> </ul>	<p>T14-52</p> <p>T14-53</p> <p>T14-54</p> <p>T14-55</p> <p>T14-56</p>
<p><b>WINTER DRIVING</b></p>	<p><b>Introduce, model, practice and discuss</b></p> <p>Driving in the winter means snow, sleet and ice that can lead to slower traffic, hazardous road conditions and unforeseen dangers</p> <ul style="list-style-type: none"> <li>• Manage risk by preparing the vehicle and driver for adverse driving conditions</li> <li>• The leading cause of death during winter storms is transportation accidents</li> </ul>	

# Student Learning Activities

# Resources



## LOW-WATER CROSSINGS

- Visit the National Oceanic and Atmospheric Administration (NOAA) at <http://www.noaa.gov/floods.html>
- This site also has an interactive map displaying current river conditions around the United States and its territories


 814 - 02  
 Sept 1998

## REDUCED RISK DRIVING HABITS IN FLOODED AREAS

- If in an area where flooding may occur, move the vehicle to higher ground if flooding is expected
- Avoid damage to the vehicle by moving it from a flooded area as soon as possible
- Do not drive unless absolutely necessary
- Do not attempt to drive through water if unsure of the depth


 814 - 03  
 Sept 1998

## REDUCED RISK DRIVING HABITS IN FLOODED AREAS

- Don't drive through fast-moving water, such as at a flooded bridge approach—the car could be swept away
- Drive slowly and steadily to avoid creating a bow wave, and allow on-coming traffic to pass first
- Keep the engine revving
- Be considerate – driving through water at speeds above a slow crawl can result in water being thrown onto pavements, soaking pedestrians or cyclists


 814 - 04  
 Sept 1998

## REDUCED RISK DRIVING HABITS IN FLOODED AREAS

- Be considerate – driving through water at speeds above a slow crawl can result in water being thrown onto pavements, soaking pedestrians or cyclists
- If the car stalls, immediately abandon it and climb to higher ground
- Watch footing, just six inches of fast-moving floodwater can sweep a person off his or her feet
- Test the brakes as soon as possible after driving through water
- If the vehicle has been in the flooded area for any prolonged period contact a mechanic for further advice
- If the vehicle has only been in a flood for a short period, drive with extreme caution and take the car to be checked at the earliest opportunity


 814 - 05  
 Sept 1998

## WINTER DRIVING



- Driving in the winter means snow, sleet and ice that can lead to slower traffic, hazardous road conditions, hot tempers and unforeseen dangers
- Manage risk by making sure the vehicle and driver are prepared
- The leading cause of death during winter storms is transportation accidents


 814 - 06  
 Sept 1998

**M14**

Instructional Topic	Content	Slide
<b>WINTER DRIVING (Cont.)</b>	<ul style="list-style-type: none"> <li>The Federal Emergency Management Agency (FEMA) provides recommendations for winter driving, as do other organizations such as the National Safety Council (NSC); check their Web site for additional information ... <a href="http://www.fema.gov/storm/winter.shtm">http://www.fema.gov/storm/winter.shtm</a> ... <a href="http://www.nsc.org/">http://www.nsc.org/</a></li> </ul>	T14-57
◆ Weather	<p>At any temperature, whether at 20° F below zero or 90° F above, weather affects road and driving conditions and can present serious problems</p> <ul style="list-style-type: none"> <li>It is important to monitor forecasts on the Web, radio, TV, cable weather channel, or in the daily papers</li> <li>Ideally, wait until the snow plows and/or sanding trucks have prepared the roads before driving</li> </ul> <p><u>Winter Storm Watches and Warnings</u> A winter storm watch indicates that severe winter weather may affect your area</p> <ul style="list-style-type: none"> <li>A winter storm warning indicates that severe winter weather conditions are definitely on the way</li> <li>A blizzard warning means that large amounts of falling or blowing snow and sustained winds of at least 35 mph are expected for several hours</li> <li>One Web source for information on winter driving is: ... <a href="http://www.fema.gov/hazards/winterstorms/winterf.shtm">http://www.fema.gov/hazards/winterstorms/winterf.shtm</a></li> </ul>	T14-58
◆ Car Preparation	<p><u>Know your car</u> Every car has different handling characteristics—know what the car can and cannot do in poor traction driving conditions</p> <ul style="list-style-type: none"> <li>Know if the vehicle is equipped with antilock brakes and traction control, how they work, and how they help ... Practice using these features in an empty parking lot before using them on the roads</li> </ul>	T14-59
	<p><u>Maintenance</u> A poorly maintained vehicle can lead to serious consequences—the steps to preparation is to check the following items:</p> <p><u>Tuneup</u>: if the vehicle is due for regular service, get it done before winter sets in—bad parts can leave drivers stranded</p> <ul style="list-style-type: none"> <li>Oil level (if necessary, replace existing oil with a winter grade oil or the SAE 10w/30 weight variety)</li> </ul>	T14-60
	<p><u>Battery</u> : Two things to remember about batteries:</p> <ul style="list-style-type: none"> <li>First, the battery that started a car easily in the summer may not have enough power to start in the winter, when the oil isn't as "fluid" as it was last July</li> <li>Second, batteries lose power as the temperature drops—cars need more power to start in winter, but get less power from the same battery</li> </ul>	T14-61


# Student Learning Activities

# Resources



## WEATHER

- At any temperature, whether at 20° F below zero or 90° F above, weather affects road and driving conditions and can present serious problems
- It is important to monitor forecasts on the Web, radio, TV, cable weather channel, or in the daily papers
- Ideally, wait until the snowplows and/or sanding trucks have prepared the roads before driving



OPI

914 - 87  
Sept 1998

## WINTER STORM WATCH AND WARNING

- A winter storm watch indicates that severe winter weather may affect your area
- A winter storm warning indicates that severe winter weather conditions are definitely on the way
- A blizzard warning means that large amounts of falling or blowing snow and sustained winds of at least 35 mph are expected for several hours
- One Web source for information on winter driving is:  
<http://www.fema.gov/hazard/habitat/storms/winterdrf.shtml>




OPI

914 - 88  
Sept 1998

## CAR PREPARATION—KNOW YOUR CAR

- Every car has different handling characteristics—know what the car can and cannot do in poor traction driving conditions
- Know if the vehicle is equipped with antilock brakes (ABS) and traction control, how they work, and how they help
- Practice using these features in an empty parking lot before using them on the roads



OPI

914 - 89  
Sept 1998

## CAR PREPARATION—KNOW YOUR CAR

### Maintenance

- A poorly maintained vehicle can lead to serious consequences—the first step to preparation is checking the following items

### Tuneup

- If the vehicle is due for regular service, get it done before winter sets in—bad parts can leave drivers stranded
- Oil level (if necessary, replace existing oil with a winter grade oil or the SAE 10w/30 weight variety)





OPI

914 - 89  
Sept 1998

## BATTERY

### Two things to remember about batteries

- First**—the battery that started a car easily in the summer may not have enough oomph to do it in winter, when the oil isn't as "fluid" as it was last July
- Second**—batteries lose power as the temperature drops—cars need MORE power to start in winter, but get LESS power from the same battery

OPI

914 - 91  
Sept 1998

M14

Instructional Topic	Content	Slide
<p>◆ Car Preparation (Cont.)</p>	<p><u>Antifreeze</u>: cars can overheat in winter, too, if they run low on or out of coolant; make certain the antifreeze will protect the car to the winter temperatures experienced in your area—for most areas, a 50-50 mix of coolant to water is needed</p> <p><u>Wipers and windshield washer fluid</u>: Make sure your windshield wipers are in good shape, the washer fluid reservoir is filled with antifreeze fluid and top it off frequently</p> <ul style="list-style-type: none"> <li>Consider winter wipers with rubber coverings that keep ice from collecting on the blade—make sure they are removed in the spring to prevent wearing out the wiper motor</li> </ul> <p><u>Window defroster</u>: Make sure the window defroster is in good working order</p> <ul style="list-style-type: none"> <li>Also the rear defroster if available should be working properly</li> </ul> <p><u>Gas tank kept close to full</u>: If the car gets stuck or stranded, the engine is the only source of heat</p> <ul style="list-style-type: none"> <li>If stuck with the engine running, be sure to crack open a window to prevent carbon monoxide asphyxiation</li> <li>Keep the exhaust pipe clear of snow</li> </ul> <p><u>Install good winter tires</u>: Make sure the tires have adequate tread—all-weather radials are usually adequate for most winter conditions</p> <ul style="list-style-type: none"> <li>Some jurisdictions require vehicles must be equipped with chains or snow tires with studs to drive on their roads</li> </ul>	<p>T14-62</p> <p>T14-63</p> <p>T14-64</p> <p>T14-65</p>
<p>—Winter Car Kit</p>	<p><u>Winter Car Kit—keep these items in the car</u>:</p> <ul style="list-style-type: none"> <li>Booster cables</li> <li>Bottled water</li> <li>Brightly colored cloth to use as a flag to alert others if stranded</li> <li>Canned or dried fruit and nuts</li> <li>Cards, games, and puzzles</li> <li>Cell phone for emergency calls</li> <li>Extra set of mittens, socks, and a wool cap</li> <li>Flashlights with extra batteries</li> <li>First aid kit with pocket knife</li> <li>Matches</li> <li>Necessary medications</li> <li>Newspapers (for insulation)</li> <li>Several blankets and sleeping bags</li> <li>Plastic bags (for sanitation)</li> <li>Rain gear and extra clothes</li> <li>Set of tire chains or traction mats</li> <li>... Practice putting the chains on and off before they are needed</li> <li>Small sack of sand for generating traction under wheels</li> <li>Small shovel</li> <li>Small tools (pliers, wrench, screwdriver)</li> <li>Windshield scraper and small broom for ice and snow removal</li> </ul>	<p>T14-66</p>

## Student Learning Activities

## Resources



## CAR PREPARATION—KNOW YOUR CAR

**Antifreeze:** Cars can overheat in winter if coolant is low or empty

- For most areas, a 50-50 mix of coolant to water is needed

**Wipers and windshield washer fluid:** Make sure your windshield wipers are in good shape and the washer fluid reservoir is filled with antifreeze fluid and top it off frequently


 914 - 82  
Sept 1998

## CAR PREPARATION—KNOW YOUR CAR

**Front window defroster works**

Also the rear defroster if available

**Gas tank kept close to full**  
If the car gets stuck or stranded, the engine is the only source of heat


 914 - 83  
Sept 1998

## CAR PREPARATION—KNOW YOUR CAR

- If stuck with the engine running, be sure to keep a window open a crack to prevent carbon monoxide asphyxiation
- Keep the exhaust pipe clear of snow


 914 - 84  
Sept 1998

## CAR PREPARATION—KNOW YOUR CAR

**Install good winter tires:** Make sure the tires have adequate tread—all-weather radials are usually adequate for most winter conditions

- Some jurisdictions require that to drive on their roads, vehicles must be equipped with chains or snow tires with studs


 914 - 85  
Sept 1998

## ✓ WINTER CAR CARE KIT

- ✓ Booster cables
- ✓ Bottled water
- ✓ Brightly colored cloth to use as a flag to alert others if stranded
- ✓ Canned or dried fruit and nuts
- ✓ Cards, games, and puzzles
- ✓ Cell phone for emergency calls
- ✓ Extra set of mittens, socks, and a wool cap
- ✓ Flashlights with extra batteries
- ✓ First aid kit with pocket knife
- ✓ Keep a windshield scraper and small broom for ice and snow removal

- ✓ Matches
- ✓ Newspapers for insulation
- ✓ Necessary medications
- ✓ Plastic bags (for sanitation)
- ✓ Rain gear and extra clothes
- ✓ Set of tire chains or traction mats
- ✓ Practice putting tire chains on and off before they are needed
- ✓ Several blankets and sleeping bags
- ✓ Small sack of sand for generating traction under wheels
- ✓ Small shovel
- ✓ Small tools (pliers, wrench, screwdriver)


 914 - 86  
Sept 1998

M14

Instructional Topic	Content	Slide
—Winter Car Kit (Cont.)	<p><u>Is sand needed?</u></p> <p>Rear-wheel drive vehicles can benefit from a few bags of sand over the rear axle—somewhere in the trunk aligned with the center of the rear wheels</p> <ul style="list-style-type: none"> <li>On front-wheel drive vehicles sandbags are not needed for weight since the engine weight is already over the front drive wheels</li> <li>If the vehicle is a front-wheel drive or all-wheel drive car, are snow tires needed?               <ul style="list-style-type: none"> <li>... The answer is “Yes,” if driving in the snow is necessary</li> <li>... If driving is needed before streets are plowed, four snow tires are best for good traction when braking and turning</li> </ul> </li> <li>Know the laws for snow tires; some states require four snow tires</li> </ul>	T14-67
◆ Wind Chill	<p><u>Wind chill</u></p> <p>“Wind chill” is a calculation of how cold it feels outside when the effects of temperature and wind speed are combined</p> <ul style="list-style-type: none"> <li>A strong wind combined with a temperature of just below freezing can have the same effect as a still air temperature about 35 degrees colder</li> </ul>	T14-68
◆ Frostbite and Hypothermia	<p>Watch for signs of frostbite and hypothermia</p> <ul style="list-style-type: none"> <li>Frostbite is a severe reaction to cold exposure that can permanently damage its victims               <ul style="list-style-type: none"> <li>... Symptoms of frostbite include a loss of feeling and a white or pale appearance in fingers, toes or nose and ear lobes</li> </ul> </li> <li>Hypothermia is a condition brought on when the body temperature drops to less than 90 degrees Fahrenheit               <ul style="list-style-type: none"> <li>...Symptoms of hypothermia include uncontrollable shivering, slow speech, memory lapses, frequent stumbling, drowsiness and exhaustion</li> </ul> </li> <li>If frostbite or hypothermia is suspected, begin warming the person slowly and seek immediate medical assistance               <ul style="list-style-type: none"> <li>... If more than one person is in the car, take turns sleeping</li> <li>... For warmth, huddle together</li> <li>... Use newspapers, maps, and even the removable car mats for added insulation</li> </ul> </li> </ul>	T14-69
◆ Blowing Snow and Whiteouts	<p>When traveling in falling snow, remember to be especially careful when the road is first covered with snow</p> <ul style="list-style-type: none"> <li>Stay alert for snow removal vehicles</li> </ul> <p>One of the major threats of winter storms is wind</p> <ul style="list-style-type: none"> <li>Wind transports moisture into the storm at the surface and aloft allowing the storm to intensify and continue unabated               <ul style="list-style-type: none"> <li>... Wind-driven snow can cause “white-out” conditions that can reduce visibility to the point that motorists cannot see the road or other vehicles</li> </ul> </li> </ul>	T14-70

## Student Learning Activities

## Resources



### WINTER CAR CARE KIT

**Is sand needed?**

- Rear-wheel drive vehicles can benefit from a few bags of sand over the rear axle—somewhere in the trunk aligned with the center of the rear wheels
- On front-wheel drive vehicles sandbags are not needed for weight since the engine is already over the front drive wheels
- Know the laws for snow tires; some states require four studded tires



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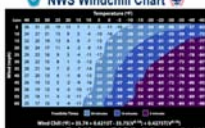
014-17  
SEP 1998

### WIND CHILL

• "Wind chill" is a calculation of how cold it feels outside when the effects of temperature and wind speed are combined

• A strong wind combined with a temperature of just below freezing can have the same effect as a still air temperature about 35 degrees colder

NWS Windchill Chart




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014-18  
SEP 1998

### FROST BITE AND HYPOTHERMIA

- Symptoms of frostbite include a loss of feeling and a white or pale appearance in fingers, toes, or nose and ear lobes
- Symptoms of hypothermia include uncontrollable shivering, slow speech, memory lapses, frequent stumbling, drowsiness, and exhaustion




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014-19  
SEP 1998

### FROST BITE AND HYPOTHERMIA

- Symptoms of frostbite include a loss of feeling and a white or pale appearance in fingers, toes, or nose and ear lobes
- Symptoms of hypothermia include uncontrollable shivering, slow speech, memory lapses, frequent stumbling, drowsiness, and exhaustion



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014-19  
SEP 1998

M14

Instructional Topic	Content	Slide
<p>◆ <b>Blowing Snow and Whiteouts (Cont.)</b></p>	<ul style="list-style-type: none"> <li>• Whiteout conditions occur most often with major storms that produce a drier, more powdery snow               <ul style="list-style-type: none"> <li>... When encountering whiteout conditions, reduce speed (a lot if necessary) until conditions improve or find a safe place to pull off of the road and remain there until the storm ends</li> <li>... A safe place to pull off of the road is one that does not obstruct traffic, like a parking lot or service station</li> </ul> </li> <li>• Wind-driven snow can also result in drifting snow               <ul style="list-style-type: none"> <li>... Snowdrifts can close roads when large enough, but there are other hidden dangers in snowdrifts</li> </ul> </li> <li>• While driving at normal speeds and suddenly plowing through a snowdrift, drivers may lose control of their vehicle</li> <li>• To avoid losing control, always reduce speed enough to make it through the snowdrift               <ul style="list-style-type: none"> <li>... This is not an easy task to master, even for experienced drivers</li> </ul> </li> </ul>	<p>T14-71</p> <p>T14-72</p>
<p>◆ <b>Blizzards</b></p>	<p><u>Blizzards are the worst of winter storms</u></p> <p>A blizzard is a storm that contains heavy snowfall, strong winds and cold temperatures</p> <ul style="list-style-type: none"> <li>• In a blizzard, winds are 35 mph or greater and visibility is reduced to less than one-fourth mile because of falling and blowing snow</li> <li>• The combination of these elements creates blinding snow with near zero visibility, deep drifts, and life-threatening wind chill factors</li> <li>• Never venture out in blizzards or continue to travel if a storm is upgraded to a blizzard—seek shelter immediately</li> <li>• A safe shelter is a public place such as a motel, restaurant, school, home, or business</li> </ul> <p><u>If trapped in car during a blizzard</u></p> <p>Stay in the car</p> <ul style="list-style-type: none"> <li>... Do not leave the car to search for assistance unless help is visible within 100 yards</li> <li>• Crack a window for ventilation</li> <li>• Display a trouble sign               <ul style="list-style-type: none"> <li>... Hang a brightly colored cloth on the radio antenna and raise the hood</li> <li>... Occasionally run engine to keep warm</li> <li>... Turn on the car's engine for about 10 minutes each hour</li> <li>... Run the heater when the car is running—turn on the car's dome light when the car is running</li> </ul> </li> <li>• Keep exhaust pipes clear of snow</li> </ul>	<p>T14-73</p> <p>T14-74</p>

## Student Learning Activities

## Resources



## BLOWING SNOW AND WHITEOUTS

- Wind-driven snow can cause "whiteout" conditions that can reduce visibility to the point that motorists cannot see the road or other vehicles
- When encountering whiteout conditions, reduce speed (a lot if necessary) until conditions improve or find a safe place to pull off of the road and remain there until the storm ends

M14- 71  
SEP 1998

## BLOWING SNOW AND WHITEOUTS

- While driving at normal speeds and suddenly plowing through a snowdrift, drivers may lose control of their vehicle
- To avoid this, always reduce speed enough to make it through the snow while not losing control
- This is not an easy task to master, even for experienced drivers

M14- 72  
SEP 1998

## BLIZZARDS— the Worst of Winter Storms

- A blizzard is a storm that contains heavy snowfall, strong winds, and cold temperatures
- Winds are 35 mph or greater - visibility is reduced to less than one-fourth mile
- Creates near zero visibility, deep drifts, and life-threatening wind chill factors
- Never venture out in blizzards or continue to travel if a storm is upgraded to a blizzard
- Seek shelter immediately

M14- 73  
SEP 1998

## IF TRAPPED IN A CAR DURING A BLIZZARD

- Stay in the car unless help is visible within 100 yards
- Crack a window for ventilation
- Display a trouble sign
- Occasionally run the engine and heater to keep warm
- Keep the exhaust pipe clear of snow

M14- 74  
SEP 1998

M14

Instructional Topic	Content	Slide
◆ Blizzards (Cont.)	<p>One of the major threats of winter storms is wind</p> <ul style="list-style-type: none"> <li>• Wind transports moisture into the storm at the surface and aloft allowing the storm to intensify and continue unabated</li> <li>... Wind-driven snow can cause "whiteout" conditions that can reduce visibility to the point that motorists cannot see the road or other vehicles</li> </ul>	
◆ Freezing Rain and Sleet	<p>Freezing rain is extremely dangerous to travelers since it can coat roadways with ice</p> <ul style="list-style-type: none"> <li>• This reduces the friction or "grabbing ability" that tires normally need to keep a car attached to the road</li> <li>... Traveling on ice should be avoided</li> <li>... Be patient and find a safe place to pull off the highway and wait for maintenance crews to apply additional deicing materials</li> </ul>	T14-75
	<p><u>Sleet and snow pellets</u></p> <p>Sleet and snow pellets often occur during major winter storms when the atmosphere is near freezing on the eastern edge of the storm</p> <ul style="list-style-type: none"> <li>• Usually this is a sign of a "large and dangerous" storm that will be followed by have strong winds and colder weather</li> <li>• Always monitor weather forecasts before traveling and keep the car's radio tuned to the local radio station when traveling</li> </ul>	T14-76
◆ Icy Roads	<p>Icy roads can create very challenging driving conditions—if driving is a must, use good driving habits</p> <ul style="list-style-type: none"> <li>• Ice is more slippery when the temperature is around the freezing mark compared to ice at subzero temperatures when ice is sticky</li> <li>• Decrease speed and leave plenty of room to stop</li> <li>... Allow at least three times more space from the vehicle in front</li> <li>• Brake gently to avoid skidding</li> <li>... If the wheels start to lock up, ease off the brake</li> <li>• Turn on headlights to increase visibility to other road users</li> <li>• Keep the headlights and windshield clean</li> <li>• Use low gears to keep traction, especially on hills</li> <li>• Don't use cruise control or overdrive on icy roads</li> <li>• Be especially careful on bridges, overpasses and infrequently traveled roads, which will freeze first</li> <li>... Even at temperatures above freezing, if the conditions are wet, ice may be encountered in shady areas or on exposed roadways such as bridges</li> <li>• Don't pass snowplows and sanding trucks--the drivers of these vehicles have limited visibility, and the road in front will be worse than the road behind</li> <li>• Don't assume the vehicle can handle all conditions</li> <li>... Even four-wheel and front-wheel drive vehicles can encounter trouble on winter roads</li> </ul>	T14-77

## Student Learning Activities

## Resources



### FREEZING RAIN AND SLEET

- Freezing rain is extremely dangerous to travelers since it can coat roadways with ice and reduce friction needed for traction
- Traveling on ice should be avoided
- Be patient and find a safe place to pull off the highway and wait for maintenance crews to apply additional deicing materials



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M14 - 16  
April 2008

### FREEZING RAIN AND SLEET

**Sleet and snow pellets**

Sleet and snow pellets often occur during major winter storms when the atmosphere is near freezing on the eastern edge of the storm

- Usually this is a sign of a "large and dangerous" storm that will have strong winds and colder weather following
- Always monitor weather forecasts before traveling and keep the car's radio tuned to the local radio station when traveling




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M14 - 18  
April 2008

### ICY ROADS

- Decrease speed and leave plenty of room to stop
- Allow at least three times more space from the vehicle in front
- Brake gently to avoid skidding
- If the wheels start to lock up, ease off the brake
- Use low gears to keep traction, especially on hills
- Don't use cruise control or overdrive on icy roads
- Be especially careful on bridges, overpasses and infrequently traveled roads, which will freeze first
- Don't assume the vehicle can handle all conditions



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M14 - 17  
April 2008

M14

Instructional Topic	Content	Slide
<b>HOT WEATHER DRIVING</b>	<p><b>Introduce, model, practice and discuss</b></p> <p>As summer time approaches, the nation's roads and highways become crowded and potentially dangerous</p> <ul style="list-style-type: none"> <li>• According to the National Highway Traffic Safety Administration (NHTSA), more Americans are killed in traffic crashes during the months of June, July and August</li> <li>• A few easy precautions can make hot weather driving less stressful and reduce risk</li> </ul>	<b>T14-78</b>
◆ <b>Vehicle Preparation</b>	<p>Prepare the vehicle to take the stress of high temperatures in the summer:</p> <ul style="list-style-type: none"> <li>• Check tire air pressure—warmer weather can increase tire pressure</li> <li>• Check the air conditioner and make sure that it is in good condition to keep occupants cool in hot weather</li> <li>• Keep extra water in the car for the cooling system               <ul style="list-style-type: none"> <li>... If the car over-heats, first wait for the engine to cool</li> <li>... Do not attempt to remove the radiator cap itself--the pressurized coolant is extremely hot and will spray out with great force</li> <li>... Do not pour water over the radiator or engine, since a dramatic change in temperature could cause damage</li> <li>... After the engine cools a bit, add a 50-50 mix of coolant and water to the reservoir to bring it up to its proper level.</li> <li>... An engine may take many hours to cool, especially on a hot day</li> <li>... If the coolant level is low, the engine should be completely cooled before adding water, or the engine could easily crack</li> </ul> </li> </ul>	<b>T14-79</b>  <b>T14-80</b>
◆ <b>Reduced Risk Driving Habits</b>	<p>When driving in hot weather it's particularly important to keep an eye on the indicator lights and gauges</p> <ul style="list-style-type: none"> <li>• If the temperature gauge moves up, turn off the air conditioner and turn on the vehicle's heater to its highest and hottest setting</li> <li>• It will be uncomfortable, but it will help draw some of the heat away from the engine               <ul style="list-style-type: none"> <li>... If stopped in traffic put the car in "park" and lightly step on the gas to help circulate coolant</li> </ul> </li> <li>• If the temperature light goes on or if the gauge enters the red zone, immediately pull off the road to a safe spot, well away from traffic               <ul style="list-style-type: none"> <li>... Do not drive any further—not even to the next exit</li> <li>... Driving with an overheated engine can cause serious damage to the engine</li> </ul> </li> </ul>	<b>T14-81</b>

## Student Learning Activities

## Resources



### HOT WEATHER DRIVING

- As summer time approaches, the nation's roads and highways become crowded and potentially dangerous
- According to the National Highway Traffic Safety Administration (NHTSA), more Americans are killed in traffic crashes during the months of June, July and August
- A few easy precautions can make hot weather driving less stressful and reduce risk

OPI  
814-1-78  
SEP-1998

### VEHICLE PREPARATION

- Prepare the vehicle to take the stress of high temperatures in the summer
  - Check tire air pressure
  - Check the air conditioner

OPI  
814-1-79  
SEP-1998

### VEHICLE PREPARATION

- If the car overheats, first wait for the engine to cool
- Do not attempt to remove the radiator cap because the pressurized coolant is extremely hot and will spray out with great force
- Do not pour water over the radiator or engine, since a dramatic change in temperature could cause damage
- After the engine cools a bit, add a 50-50 mix of coolant and water to the reservoir to bring it up to its proper level.
- An engine may take many hours to cool, especially on a hot day
- If the coolant level is low, the engine should be completely cooled before adding water, or the engine could easily crack

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SEP-1998

### Reduced Risk Driving Habits in Hot Weather

TEMPERATURE GAUGE

- Check the indicator lights and gauges frequently
- If the temperature gauge moves up, turn off the air conditioner and turn on the vehicle's heater to its highest and hottest setting
- If stopped in traffic put the car in "park" and lightly step on the gas to help circulate coolant
- If the temperature light goes on or if the gauge enters the red zone, immediately pull off the road to a safe spot, well away from traffic

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814-1-81  
SEP-1998

M14

Instructional Topic	Content	Slide
<p>◆ <b>Reduced Risk Driving Habits</b></p> <p><b>ASSIGNMENT</b></p> <p><b>ASSESSMENT</b></p>	<p>Summer heat can pose dangers</p> <ul style="list-style-type: none"> <li>• Never leave a child or pet in a parked car in summer heat               <ul style="list-style-type: none"> <li>... Even an outside temperature in the 80's can quickly bring a car interior to well over 140°.</li> <li>... Always lock the doors and trunk—even at home—and keep keys out of children's reach</li> <li>... Watch children closely around cars, particularly when loading and unloading</li> <li>... Check to ensure that all children are accounted for when leaving the vehicle</li> <li>... Don't overlook sleeping infants</li> </ul> </li> <li>• When restraining children in a car that has been parked in the heat, check to make sure that seating surfaces and equipment (car seat and seat belt buckles) are not overly hot</li> <li>• Check tire air pressure</li> </ul> <p>Summer time brings out thousands of joggers and cyclists—be aware of them and share the road</p> <ul style="list-style-type: none"> <li>• If traveling a long distance, plan the trip for early in the morning or late in the evening--the weather is a bit cooler and will make it easier on the car's engine</li> <li>• Take breaks while on a long drive</li> <li>• Bring a cell phone for emergency calls</li> </ul> <p>To keep the interior of the vehicle a few degrees cooler consider:</p> <ul style="list-style-type: none"> <li>• Tint the windows ensuring the tint complies with all regulations</li> <li>• Use a Sun Shade or similar device when parked—it can also protect the dash from the sun's harmful effects</li> <li>• Keep the windows open for the first few minutes of driving after it has been parked—even with the air conditioner on               <ul style="list-style-type: none"> <li>... This will allow the hot interior air to escape and allow the vehicle's air conditioner to work better, sooner</li> </ul> </li> </ul>	<p>T14-82</p> <p>T14-83</p> <p>T14-84</p> <p>T14-85</p>

## Student Learning Activities

## Resources



**Reduced Risk Driving Habits in Hot Weather**

- Never leave a child or pet in a parked car in summer heat—outside temperature in the 80's can quickly bring a car's interior to well over 140°.
- Always lock the doors and trunk—even at home—and keep keys out of children's reach
- Watch children closely around cars, particularly when loading and unloading



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**Reduced Risk Driving Habits in Hot Weather**


- Check to ensure that all children are accounted for when leaving the vehicle
- Don't overlook sleeping infants
- When restraining children in a car that has been parked in the heat, check to make sure that seating surfaces and equipment (car seat and seat belt buckles) are not overly hot
- Check tire air pressure



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**Reduced Risk Driving Habits in Hot Weather**

- Summertime brings out thousands of joggers and cyclists—be aware of them and share the road
- If traveling a long distance, plan the trip for early in the morning or late in the evening—the weather is a bit cooler and will make it easier on the car's engine
- Take breaks while on a long drive
- Bring a cell phone for emergency calls



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**Reduced Risk Driving Habits in Hot Weather**

To keep the interior of the vehicle a few degrees cooler consider the following:

- Tint the windows ensuring the tint complies with all regulations
- Use a sun shade
- Keep the windows open for the first few minutes of driving after it has been parked—even with the air conditioner on to allow the hot interior air to escape and allow the vehicle's air conditioner to work better, sooner




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M14